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PROTECTION OF THE ATMOSPHERE: OZONE DEPLETION

Report of the Secretary-General of the Conference

I. INTRODUCTION

1. This report was prepared in response to decision 1/12 of the first session of the Preparatory Committee for the United Nations Conference on Environment and Development, requesting the UNCED secretariat to co-operate with the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in evaluating the need for any additional action to be taken by the Preparatory Committee to support the ongoing work within the framework of the Vienna Convention and the Montreal Protocol; and requesting the Secretary-General of the Conference to report on that question to the Preparatory Committee at its third session (A/45/46, Annex I). The Preparatory Committee also requested the Secretary-General of the Conference, in co-operation with UNEP, to report to the Preparatory Committee on the effectiveness of the implementation of the provisions relating to financial co-operation and transfer of technology to developing countries of the Montreal Protocol, as amended by the second meeting of the Parties to the Protocol in 1990.

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2. Preparation of this report benefited from contributions and comments received from the UNEP and WMO secretariats as well as from independent experts participating in the UNCED Working Party on the Atmosphere. The report takes into account the decisions of the second meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer (Nairobi, 17-19 June 1991) and of the third meeting of the Parties to the Montreal Protocol on Substances That Deplete the Ozone Layer (Nairobi, 19 to 21 June 1991).

3. Pending a detailed discussion of the topic of ozone depletion at the third session of the Preparatory Committee, the cross-sectoral linkages and specific options for action arising from the present document remain to be integrated in the overview document on "Protection of the atmosphere: options for agenda 21" (A/CONF.151/PC/42/Add.1).

II. BACKGROUND

Recent scientific findings

4. The first meeting of ozone research managers of the Parties to the Vienna Convention for the Protection of the Ozone Layer (Geneva, 13-15 March 1991) summarized the current status of scientific understanding of the stratospheric ozone issue as follows:

(a) Analysis of data over the past twelve months has provided further support for the conclusion that the "ozone hole" appearing during the Antarctic spring season is the result of chemical ozone destruction by reactive chlorine and bromine from man-made chlorofluorocarbons (CFCs) and halons.

(b) In 1990, the Antarctic springtime depletion of the ozone layer was as severe as in 1987 and 1989. A noticeable feature in 1990 was the extraordinary persistence of the southern polar vortex and the region of depleted ozone within; the ozone hole did not disappear until late December, after the summer solstice.

(c) The late break-up of the south polar vortex raises the question of a possible link between ozone depletion and changes in the atmospheric dynamics of the southern hemisphere due to changes in the radiative properties of the stratosphere; but no definitive statement can be made at this time. Similarly no definite statement can be made concerning the implication for marine surface biota in the southern ocean of the enhanced UV-B fluxes resulting from ozone depletion.

(d) Transport of ozone-depleted air from Antarctica to other parts of the southern hemisphere has been observed for short periods in the late spring and summer.

(e) Measurements in the Arctic have shown that stratospheric composition is highly perturbed in late winter. The unexpectedly large amounts or reactive chlorine reflect a potential for large ozone depletion. There are indications of local ozone depletion during short time periods which may be related to chlorine.

(f) Provisional results from a new analysis of the past 12 years of satellite data indicate that total ozone between 65/N and 65/S has been decreasing at an average rate of about 3% per decade, after correction for known natural influences on ozone.

(g) Analysis of both ground-based and satellite data for the northern hemisphere indicates ozone decline during the winter season at all latitudes north of 20/N, with depletions up to 8% in the most northern latitudes over the past 12 years. At the mid-latitudinal belt (30-50/N), significant reductions (4-5%) of the long term average total ozone have occurred during the same period and, perhaps more significantly, there is a stronger reduction in spring when the growing season is in progress. In the southern hemisphere during the past 12 years, the depletion was about 3-6% at the 30-50/S latitudinal belt and much stronger polarward.

(h) Analysis of the ozone record clearly shows that the decreases which have occurred over the past 10 years are larger than the trends in previous decades. There is a strong ozone decline about 0.5% per year in the lower stratosphere of the middle and northern latitudes which is not to be explained by the current gas-phase models.

(i) All the reported downward trends in ozone, which have been confirmed by several independent analyses of the data, are substantially greater than the predicted decrease from classical, gas-phase, state-of-the-art atmospheric models. For example, in the northern hemisphere the model-predicted depletions are lower by a factor of 2 to 3 than those observed, depending on altitude, latitude and season.

(j) There are major limitations in current models due to their inability to represent satisfactorily the heterogeneous chemistry that is believed to be involved in rapid ozone depletion by chlorine. This probably accounts, at least in part, for the discrepancy between modelled and observed ozone changes.

(k) The total amount of chlorine compounds in the atmosphere ("chlorine loading") has continued to rise and will continue to do so until there is at least 90% compliance with the phase-out of CFCs and other halogenated molecules stipulated by the revised Montreal Protocol.

(l) After phase-out of CFC production in accordance with the Montreal Protocol, chlorine loading will continue to rise due to release of "banked" material (in storage and contained applications), leading to a peak between 2000 and 2010. Thereafter chlorine loading will decay at a rate depending on the amount and nature of substitute compounds that are used. There is a similar problem with bromine compounds.

(m) In order to return to a chlorine loading of 2 ppb ("pre-Antarctic ozone hole" levels) by 2050, all production of short-lived chlorine-containing halocarbons will need to be phased out by 2030 at the latest. It follows that any substitution of CFCs by HCFCs (listed as "transitional substances" under Annex C of the London amendments to the Montreal Protocol) will have to be moderate and temporary, if this goal is indeed to be achieved by the year 2050.

(n) The development of supersonic civil air transport is being re-considered in several countries. An updated assessment of the impact of the exhaust emissions (mainly nitrogen oxides) from a fleet of such aircraft, as well as from rockets and multiple-use space vehicles, confirms earlier prognoses that significant depletion of stratospheric ozone may occur. The degree of depletion predicted by the models is critically dependent on the altitude of pollutant injection.

5. Much of our current knowledge of world-wide trends in ozone concentration and depletion is based on data gathered by the Global Ozone Observing System (GO_3OS) operated by WMO as part of its Global Atmosphere Watch and as input to the UNEP Global Environment Monitoring System. The GO_3OS network of 140 ground-based stations, supplemented by satellite observations, needs to be expanded, especially for monitoring of ultraviolet (UV-B) radiation and for background monitoring of tropospheric ozone in developing countries (in the tropical belt and the southern hemisphere in particular) and in the Arctic.

Assessments

6. In accordance with article 6 of the Montreal Protocol on Substances that Deplete the Ozone Layer, comprehensive assessments of the available scientific information, environmental effects and technological/economic implications of stratospheric ozone depletion are currently being prepared for the fourth meeting of the Parties to the Protocol, scheduled to be held in Denmark in September/October 1992. These assessments, their executive summaries, and a synthesis report will be available to Governments by 1 January 1992. A concise summary of the key conclusions from the earlier assessments completed in July 1989, together with information on recent scientific and technological advances, was prepared for the Nairobi meeting of Parties to the Vienna Convention for the Protection of the Ozone Layer in June 1991 (R.T. Watson, Ozone Depletion: Draft Issues Paper, UNEP/OzL.Conv.2/Inf.2).

III. BASIS FOR INTERNATIONAL ACTION

7. The Vienna Convention for the Protection of the Ozone Layer was signed in March 1985 and entered into force in September 1988. As of 5 June 1991, 76 States and the European Economic Community (EEC) had become Parties to the Convention. The Bureau of the Conference of Parties to the Convention met in Geneva in March 1991, in conjunction with a meeting of ozone research managers jointly organized by UNEP and WMO, which reviewed ongoing monitoring and research programmes and made recommendations for future work.

8. Within the framework of the Vienna Convention, the Montreal Protocol on Substances That Deplete the Ozone Layer was signed in September 1987 and entered into force in January 1989. As of 5 June 1991, 70 States and the EEC had become Parties to the Protocol. A number of adjustments and amendments were adopted at the second meeting of the Parties to the Protocol, held in London in June 1990. While the adjustments automatically entered into force in March 1991, the amendments are subject to ratification by at least 20 Parties and are expected to enter into force in 1992.

9. The Vienna Convention and its Montreal Protocol were designed as dynamic and flexible instruments capable of evolving and adjusting in the light of new scientific/technological information by means of periodic international assessments, and with built-in compliance controls through data reporting and monitoring of national implementation. Over the past six months, meetings were held of the following subsidiary bodies established under the Montreal Protocol:

- Bureau (first meeting, Nairobi, 14-15 March 1991; second meeting, Nairobi, 19 June 1991);

- Open-ended Working Group (fifth meeting, on trade and product controls; Nairobi, 3-5 December 1990);

- Ad-hoc Group of Experts on Data Reporting (first meeting, Nairobi, 6-7 December 1990);

- Technology and Economics Assessment Panel (organizational meeting, Washington/D.C., 17-18 January 1991);

- Scientific Assessment Panel (organizational meeting, Washington/D.C., 8-9 April 1991);

- Ad-hoc Working Group of Legal Experts on Non-compliance (second meeting, Geneva, 8-10 April 1991)

- Implementation Committee under the Non-compliance Procedure (first meeting, Nairobi, 10-11 December 1990; second meeting, Geneva, 11-13 April 1991).

10. Furthermore, the 1990 London meeting of Parties to the Montreal Protocol established an Interim Multilateral Ozone Fund, supervised by an Executive Committee consisting of seven members from developing countries and seven members from developed countries, with the offices of chairman and vice-chairman rotating annually between the two groups. The Executive Committee has held four meetings to date (Montreal, 19-21 September 1990, 17-19 December 1990, 15-19 April 1991; and Nairobi, 17-18 June 1991).

IV. IMPLEMENTATION OF PROVISIONS RELATING TO FINANCING AND TECHNOLOGY TRANSFER

11. By decision 1/12(c), the Preparatory Committee specifically requested information on the effectiveness of the implementation of the provisions of the Montreal Protocol (as amended at London in 1990) relating to financial co-operation and transfer of technology to developing countries. A report by the Executive Director of UNEP to the Parties to the Montreal Protocol (UNEP/OzL.Pro.3/3 and Add.1) deals with the overall status of the implementation of decisions taken at the London Meeting and subsequent developments up to 14 April 1991. The Executive Committee of the Interim Multilateral Fund for the Implementation of the Montreal Protocol reported to the Parties (UNEP/OzL.Pro/ExCom/4/12/Rev.1, as amended) on progress in the implementation of decisions relating to the Fund. Further relevant information is contained in the budgetary documents as approved by the third meeting of the Parties to the Protocol.

Financial co-operation to facilitate participation

12. In accordance with article 4, paragraph 2, of the Vienna Convention and article 10 of the Montreal Protocol, the Parties have agreed to provide technical assistance to developing countries to facilitate participation in the Protocol. According to information from the UNEP secretariat (UNEP/OzL.Conv.2/4 and UNEP/OzL.Pro.3/9), the cost of the participation of representatives from developing countries in meetings convened under the Vienna Convention and the Montreal Protocol for 1991 was estimated at a total of US$ 820,000, which were met from the following sources: the Vienna Convention Trust Fund, the Montreal Protocol Trust Fund, the Finnish Ozone Trust Fund, and counterpart contributions.

13. The 1992-1993 budget approved by the third meeting of the Parties to the Montreal Protocol includes total estimated costs of participation of representatives of developing countries amounting to US$ 480,000 for 1992, and US$ 576,000 for 1993. It was pointed out that the status of agreed contributions by Parties towards the Vienna and Montreal Trust Funds showed substantial arrears and that the continued participation of representatives from developing countries, especially in the assessment panel meetings scheduled, was crucially dependent on timely payment of outstanding contributions.

Financial co-operation for operational activities

14. The Interim Multilateral Ozone Fund was set up by the Parties to the Montreal Protocol at their 1990 meeting in London "to enable developing countries to meet the requirements of the present and a future strengthened Protocol, thereby addressing the ozone depletion and related problems". As a result of the recent accession by China, the total budget figure for the initial three-year period of the Fund was raised from US$ 160 million to 200 million by decision of the third meeting of the Parties to the Montreal Protocol, with consequential adjustment of the original scale of contributions. The Fund became operational on 1 January 1991, administered by a secretariat located in Montreal, under over-all guidance by the Executive Committee. Paid contributions as of 13 June 1991 amounted to US$ 12,697,609.

15. The Executive Committee at its fourth meeting (Nairobi, 17-18 June 1991) adopted a three-year budget for Fund operations. On the basis of interagency agreements and approved work programmes concluded with the World Bank, UNEP and UNDP as implementing agencies, the Committee made operational budget allocations for 1991 as follows: US$ 1,676,920 to UNEP; US$ 1,261,800 to UNDP; and US$ 5,000,000 to the World Bank. Possible additional allocations will be considered at the fifth meeting of the Committee, together with the 1992 proposals.

16. The Executive Committee has also approved implementation guidelines and criteria for project selection (UNEP/OzL.Pro/ExCom/3/18,Annex III), on the understanding that the document would be subject to further development after one year in the light of the experience gained. Parties were invited to draw

up country programmes to serve as a basis for project operation and financing from the Fund, for consideration at the fifth meeting of the Executive Committee. In the context of a discussion on the classification of "developing countries", at the third meeting of the Parties to the Montreal Protocol, the Open-ended Working Group of the Parties was requested to study and define criteria for classification, to be considered at the fourth or fifth meeting of the Parties.

17. In this context, it was pointed out that countries not eligible for support from the Multilateral Fund could apply for assistance from the Global Environment Facility (GEF). Following the establishment of the GEF with formal approval by the Board of the World Bank (March 1991), the UNEP Governing Council (May 1991) and the UNDP Governing Council (June 1991), the initial phase of the three-year pilot programme has now begun, under guidance from a tripartite Implementation Committee and a Scientific and Technical Advisory Panel; the first meeting of the Participants in the GEF was held at Washington/D.C. on 1-2 May 1991. As of 31 March 1991, contributions to the "core" Global Environment Trust Fund stood at SDR 599 million, bringing total GEF commitments (i.e., including the Interim Multilateral Ozone Fund, and associated co-financing arrangements) to SDR 935 million. While the bulk of GEF funds will go towards projects in the field of global warming, biodiversity and international waters, approximately $30-50 million of the three-year budget may be expected to be allocated to projects concerning ozone depletion. Several countries not eligible for support from the Interim Multilateral Fund (e.g., Czechoslovakia and Panama) have already indicated their intention to apply for GEF funding; pursuant to an understanding between the World Bank and UNEP, ozone-related project funding will, however, be restricted to Parties to the Montreal Protocol.

Technical co-operation and technology transfer

18. The "Draft Issues Paper: Ozone Depletion" prepared for the second meeting of the Conference of Parties to the Vienna Convention in June 1991 (UNEP/OzL.Conv.2/Inf.3) identified five major concerns and special needs of developing countries as part of a global effort to protect stratospheric ozone: (i) the cost of CFC supply; (ii) the cost of new chemical substitutes; (iii) the cost of imported products made now with CFCs and that later will be made with new alternatives; (iv) the cost of access to new technology; and (v) maintenance of trade with Parties to the Montreal Protocol in products made with or containing CFCs and halons. Currently, the lack of technical knowledge and financial resources of developing countries inhibits the adoption of certain CFC/halon replacement technologies and the definition and implementation of the best national options for the transition to CFC-free technologies. Development assistance and funding is needed for the transfer of technology during the transition period because currently available resources are already strained as a result of the world debt problem and the dire economic situation of many countries.

19. In response to these special needs, the revised work programmes submitted to the Interim Multilateral Ozone Fund by the World Bank, UNDP and UNEP, and approved by the Executive Committee of the Fund at its fourth meeting (Nairobi, 17-18 June 1991), include the following activities:

- The World Bank envisages activities -- ranging from country-wide reconnaissance of ozone-depleting substance consumption and institutional resources, to country framework plans and phase-out plans - for 16 countries during 1991 (Bangladesh, Chile, Ecuador, Egypt, Ghana, Jordan, Kenya, Malaysia, Mexico, Nigeria, Philippines, Sri Lanka, Thailand, Trinidad & Tobago, Tunisia and Yugoslavia), with two further countries being considered (Brazil and Venezuela) and two additional country programmes planned to start in 1992 (Argentina and Guatemala).

- The key objectives of the work programme of the United Nations Development Programme (UNDP) are to achieve a cost-effective reduction in the production and consumption of substances controlled under the Montreal Protocol in developing countries, and to promote effective technology transfer through technical assistance and on-site training. The countries covered in 1991 are Argentina, Bangladesh, Costa Rica, Egypt, Ghana, Iran, Jordan, Kenya, Mexico, Nigeria, Trinidad & Tobago and Uruguay; further project activities are anticipated in Malaysia, the Philippines, Thailand and Venezuela.

- UNEP will undertake country studies for six low-volume CFC-consuming countries (Maldives, Syria, Uganda, Zimbabwe, two unidentified) to supplement the major studies underway by the World Bank and UNDP, and to update information already held; three regional training workshops on CFC replacement technologies and policy development; and a worldwide technical information exchange system, through the operation of a computerized clearing-house and the preparation of technical brochures and guidelines on CFC phase-out.

V. POTENTIAL AREAS FOR ADDITIONAL SUPPORT ACTION

20. By decision I/12(b), the Preparatory Committee requested the Secretary-General to co-operate with UNEP and WMO in evaluating the need for any additional action to be taken by the Committee to support the ongoing work within the framework of the Vienna Convention and the Montreal Protocol. Taking into account the decisions of the second meeting of the Conference of Parties to the Vienna Convention and the third meeting of Parties to the Montreal Protocol (Nairobi, June 1991), the Preparatory Committee may wish to consider the following options for further support action:

(a) Participation

21. The UNEP Governing Council, by decision 16/40 of 31 May 1991, urged States that have not already done so to ratify, accept or approve the Montreal Protocol and its 1990 amendment, and to pay their contributions towards the Vienna/Montreal Trust Funds and the Interim Multilateral Ozone Funds.

Considering the importance of universal participation and the urgent need for funding of international programmes, the Preparatory Committee could reiterate this appeal.

(b) Monitoring

22. The second meeting of the Conference of Parties to the Vienna Convention, by decision II/9 of 19 June 1991, called for expanding the Global Ozone Observing System Network (GO_3OS) operated by WMO. In particular, Parties were requested to facilitate through bilateral and multilateral contributions the expansion of GO_3OS stations in territory of suitable and interested developing countries (especially in the tropical belt and the southern hemisphere, where 12 to 15 additional stations will be needed, with related calibration and training requirements). Developed countries were requested to make voluntary contributions for GO_3OS through the WMO Special Fund for Environmental Monitoring; and developing countries were requested to make ozone layer monitoring a priority in their requests for bilateral and multilateral assistance in the context of GO_3OS. The Preparatory Committee could express its support for this initiative.

(c) Assessment

23. There still are a number of areas of uncertainty in current knowledge concerning the environmental effects of ozone depletion, including (i) quantification of the primary effects on food production and quality, on forestry, and natural ecosystems; (ii) development of biotechnology for replacement of sensitive crops, especially in tropical areas; (iii) clarification and quantification of influences on human health, especially the immune system, and occurrences of melanomas and cataracts. The Preparatory Committee, in encouraging Governments to participate actively in the ongoing assessment panels for the 1992 meeting of the Parties to the Montreal Protocol, could emphasize the need for further research efforts in these areas.

(d) Standard-setting

24. Even with the present level of scientific and technological knowledge, it is clear that the forthcoming fourth meeting of Parties to the Montreal Protocol in September/October 1992 will have to envisage a further tightening of standards for the production and consumption of ozone-depleting substances. The regional Ministerial Conference on Environment for Europe, held at Dobris/Prague on 21-23 June 1991, urged Governments to participate fully in the next review of the Protocol and to consider in 1992 to accelerate further the timetables for phasing out ozone-depleting substances. The Preparatory Committee could take up this recommendation in a global context, also taking into consideration the potential role of "transitional substances" (such as HCFCs) as greenhouse gases.

(e) Implementation

25. The Montreal Protocol initiated an innovative process of compliance control, through its procedures for data reporting and measures for monitoring implementation. With a view to enhancing the continued effectiveness of internationally agreed measures under the Protocol, the Preparatory Committee could encourage the Parties to improve and expand this process.

(f) Financial co-operation

26. The existing international mechanisms for funding of ozone-related activities and projects in developing countries are crucially dependent on country programmes, in order to identify priorities and to guide action at the national level. The Preparatory Committee could call for strengthening technical assistance to develop country programmes in eligible developing countries, and for appropriate harmonization of project selection criteria and guidelines between the international agencies concerned (e.g., see A/CONF.151/PC/51 on financial resources).

(g) Technology transfer

27. Significant advances have been made with regard to "ozone-friendly" technologies and products, including a range of technologies that were not widely available in 1989 but are now fully commercialized (e.g., in the field of solvents, sterilization, refrigeration and air conditioning, rigid and flexible foams, and halon). In order to ensure that these advances in "public interest" technology can be put to optimal use world-wide, the Preparatory Committee could appeal to the industries concerned and to the international business community at large to contribute fully towards ongoing efforts under the Montreal Protocol and its implementing mechanisms and suggest further measures towards this end (e.g., see A/CONF.151/PC/53 on technology transfer).